МІНІСТЕРСТВО ОСВІТИ І НАУКИ, МОЛОДІ ТА СПОРТУ УКРАЇНИ
ХАРКІВСЬКА НАЦІОНАЛЬНА АКАДЕМІЯ
МІСЬКОГО ГОСПОДАРСТВА

ЗБІРНИК ТЕКСТІВ І ЗАВДАНЬ ДО САМОСТІЙНОЇ РОБОТИ З ДИСЦИПЛІНИ **“ІНОЗЕМНА МОВА ПРОФЕСІЙНОГО СПРЯМУВАННЯ” (АНГЛІЙСЬКА МОВА)**

(для студентів 1 – 2 курсів заочної форми навчання напряму підготовки 6.080101 «Геодезія, картографія та землеустрій»)

Харків – ХНАМГ – 2011

Збірник текстів і завдань до самостійної роботи з дисципліни ‘Іноземна мова професійного спрямування’ (англійська мова) для студентів 1 – 2 курсів заочної форми навчання напряму 6.080101 «Геодезія, картографія та землеустрій» / Харк. нац. акад. міськ. госп-ва; уклад.: А. М. Крохмаль. – Х.: ХНАМГ, 2011. – 30 с.

Укладач: А. М. Крохмаль

Збірник текстів і завдань призначений для студентів заочної форми навчання, які у майбутньому будуть працювати у сфері геоінформаційних технологій. Тематика збірника дає змогу ознайомитися з історією виникнення геодезії та картографії, основні програми геоінформаційних систем, джерела та види картограм,моделювання карт. Запропонована інформація є необхідною для ефективного виконування професійних обов’язків майбутніх спеціалістів.

Рецензент: старший викладач кафедри іноземних мов Харківської національної академії міського господарства Н. І. Видашенко

Затверджено на засіданні кафедри іноземних мов,
протокол №8 від 03.04.2010 р.

INTRODUCTION

The tasks are designed for students studying English for specific purposes (ESP). There are twenty units. It is assumed that the students doing the tasks get detailed up-to-date information of using GIS to play a role at work and in the community. It is also expected that the students doing these tasks have the knowledge of and ability to use English up to intermediate and upper intermediate levels.

The tasks are based on the authentic texts concerning specifically the geographical information systems and technology. The units focus on the GIS's roots in cartography, maps and numbers, on getting the map into the computer and basic database management.

The presented educational materials and the choice of tasks are supposed to provide practice in using the professional lexis, in reading and comprehending the specific information, in translating from English and into English and also to give a reasonable motivation for mastering the basics of GIS in English.

Words and phrases unique to the vocabulary of GIS are italicized and defined as they are introduced.

TEXT 1

HISTORY OF DEVELOPMENT (1)

1. Read and translate the text.

About 15,500 years ago, on the walls of caves near Lascaux, France, Cro-Magnon hunters drew pictures of the animals they hunted. Associated with the animal drawings are track lines and tallies thought to depict migration routes. While simplistic in comparison to modern technologies, these early records mimic the two-element structure of modern GIS, an image associated with attribute information.

In 1854, John Snow depicted a cholera outbreak in London using points to represent the locations of some individual cases, possibly the earliest use of the geographic method. His study of the distribution of cholera led to the source of the disease, a contaminated water pump (the Broad Street Pump, whose handle he disconnected terminating the outbreak) within the heart of the cholera outbreak.

E. W. Gilbert‘s version (1958) of John Snow‘s 1855 map of the Soho cholera outbreak showing the clusters of cholera cases in the London epidemic of 1854.

While the basic elements of topography and theme existed previously in cartography, the John Snow map was unique, using cartographic methods not only to depict but also to analyze clusters of geographically dependent phenomena for the first time.

The early 20th century saw the development of ‘photo lithography’ where maps were separated into layers. Computer hardware development spurred by nuclear weapon research would lead to general purpose computer ‘mapping’ applications by the early 1960s.

2. Answer the following questions.

1. What were the earliest records of modern GIS?
2. How did John Snow depict a cholera outbreak in London in 1854?
3. What is ‘photo lithography’?

TEXT 2
HISTORY OF DEVELOPMENT (2)

1. Read and translate the text.

The year 1962 saw the development of the world’s first true operational GIS in Ottawa, Ontario, Canada by the federal Department of Forestry and Rural Development. Developed by Dr. Roger Tomlinson, it was called the ‘Canada Geographic Information System‘ (CGIS) and was used to store, analyze, and manipulate data collected for the Canada Land Inventory (CLI) – an initiative to determine the land capability for rural Canada by mapping information about soils, agriculture, recreation, wildlife, waterfowl, forestry, and land use at a scale of 1:50,000. A rating classification factor was also added to permit analysis.

CGIS was the world’s first ‘system’ and was an improvement over ‘mapping’ applications as it provided capabilities for overlay, measurement, and digitizing /

scanning. It supported a national coordinate system that spanned the continent, coded lines as ‘arcs’ having a true embedded topology, and it stored the attribute and locational information in separate files. As a result of this, Tomlinson has become known as the ‘father of GIS’, particularly for his use of overlays in promoting the spatial analysis of convergent geographic data. CGIS lasted into the 1990s and built the largest digital land resource database in Canada. It was developed as a mainframe based system in support of federal and provincial resource planning and management. Its strength was continent-wide analysis of complex datasets. The CGIS was never available in a commercial form.

2. Answer the following questions.

1. What was CGIS used for by Dr. Roger Tomlinson?
2. Which capabilities did CGIS provide for?
3. Why has Tomlinson become known as the ‘father of GIS’?

TEXT 3
HISTORY OF DEVELOPMENT (3)

1. Read and translate the text.

In 1964, Howard Fisher formed the Laboratory for Computer Graphics and Spatial Analysis at the Harvard Graduate School of Design (LCGSA 1965 – 1991), where a number of important theoretical concepts in spatial data handling were developed, and which by the 1970s had distributed seminal software code and systems, such as ‘SYMAP’, ‘GRID’, and ‘ODYSSEY’ – which served as literal and inspirational sources for subsequent commercial development – to universities, research centers, and corporations worldwide.

By the early 1980s, M&S Computing, Environmental Systems Research Institute (ESRI) and CARIS (Computer Aided Resource Information System) emerged as commercial vendors of GIS software, successfully incorporating many of the CGIS features, combining the first generation approach to separation of spatial and attribute information with a second generation approach to organizing attribute data into database structures. In parallel, the development of two public domain systems began in the late 1970s and early 1980s. MOSS, the Map Overlay and Statistical System project started in 1977 in Fort Collins, Colorado under the auspices of the Western Energy and Land Use Team (WELUT) and the US Fish and Wildlife Service. GRASS GIS was begun in 1982 by the U.S. Army Corps of Engineering Research Laboratory (USA – CERL) in Champaign, Illinois, a branch of the U.S. Army Corps of Engineers to meet the need of the United States military for software for land management and environmental planning. The later 1980s and 1990s industry growth were spurred on by the growing use of GIS on Unix workstations and the personal computer. By the end of the 20th century, the rapid growth in various systems had been consolidated and standardized on relatively few platforms and users were beginning to export the concept of viewing GIS data over the Internet, requiring data format and transfer standards. More recently, there are a growing number of free, open source GIS packages which run on a range of operating systems and can be customized to perform specific tasks.

2. Answer the following questions.

1. What was Laboratory for Computer Graphics and Spatial Analysis known by?
2. When did M&S Computing, Environmental Systems Research Institute and Computer Aided Resource Information System emerge as commercial vendors of GIS software?
3. When did the Map Overlay and Statistical System project start?

TEXT 4

GIS SOFTWARE. BACKGROUND

1. Read and translate the text.

Geographic information can be accessed, transferred, transformed, overlaid, processed and displayed using numerous software applications. Within industry, commercial offerings from companies such as Autodesk, Bentley Systems, ESRI, Intergraph, Manifold System, Mapinfo and Smallworld dominate, offering an entire suite of tools. Government and military departments often use custom software, open source products such as GRASS, or more specialized products that meet a well defined need. Although free tools exist to view GIS datasets, public access to geographic information is dominated by online resources such as Google Earth and interactive web mapping.

Originally up to the late 1990s, when GIS data was mostly based on large computers and used to maintain internal records, software was a stand-alone product. However with increased access to the internet and networks and demand for distributed geographic data grew, GIS software gradually changed its entire outlook to the delivery of data over a network. GIS software is now usually marketed as combination of various interoperable applications and APIs.

Modern GIS technologies use digital information, for which various digitized data creation methods are used. The most common method of data creation is digitization, where a hard copy map or survey plan is transferred into a digital medium through the use of a computer-aided design (CAD) program, and geo-referencing capabilities. With the wide availability of ortho-rectified imagery (both from satellite and aerial sources), heads-up digitizing is becoming the main avenue through which geographic data is extracted. Heads-up digitizing involves the tracing of geographic data directly on top of the aerial imagery instead of by the traditional method of tracing the geographic form on a separate digitizing tablet (heads-down digitizing).

2. Answer the following questions.

1. In which branches can GIS software applications be used?
2. What is the most common method of data creation?
3. What does heads-up digitizing involve?

TEXT 5

RELATING INFORMATION FROM DIFFERENT SOURCES

1. Read and translate the text.

You might be able to tell which wetlands dry up at certain times of the year. Using information from many different sources in many different forms, GIS can help with such analysis. The primary requirement for the source data consists of knowing the locations for the variables. Location may be annotated by x, y, and z coordinates of longitude, latitude, and elevation, or by other geocode systems like ZIP Codes or by highway mile markers. Any variable that can be located spatially can be fed into a GIS. Several computer databases that can be directly entered into a GIS are being produced by government agencies and non-government organizations. Different kinds of data in map form can be entered into a GIS.

A GIS can also convert existing digital information, which may not yet be in map form, into forms it can recognize and use. For example, digital satellite images generated through remote sensing can be analyzed to produce a map-like layer of digital information about vegetative covers.

Likewise, census or hydrological tabular data can be converted to map-like form, serving as layers of thematic information in a GIS.

2. Answer the following questions.

1. With which analysis can GIS help?
2. Which coordinates may a location be annotated by?
3. Which form can a GIS convert digital information into?

TEXT 6
DATA REPRESENTATION
RASTER

1. Read and translate the text.

GIS data represents real world objects (roads, land use, elevation) with digital data. Real world objects can be divided into two abstractions: discrete objects (a house) and continuous fields (rain fall amount or elevation). There are two broad methods used to store data in a GIS for both abstractions: Raster and Vector.

A raster data type is, in essence, any type of digital image represented in grids. Anyone who is familiar with digital photography will recognize the pixel as the smallest individual unit of an image. A combination of these pixels will create an image, distinct from the commonly used scalable vector graphics which are the basis of the vector model. While a digital image is concerned with the output as representation of reality, in a photograph or art transferred to computer, the raster data type will reflect an abstraction of reality. Aerial photos are one commonly used form of raster data, with only one purpose, to display a detailed image on a map or for the purposes of digitization. Other raster data sets will contain information regarding elevation, a DEM, or reflectance of a particular wavelength of light, LANDSAT.

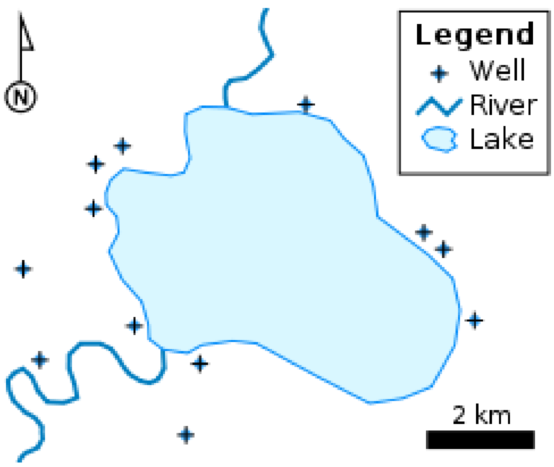
Raster data type consists of rows and columns of cells, with each cell storing a single value. Raster data can be images (raster images) with each pixel (or cell) containing a colour value. Additional values recorded for each cell may be a discrete value, such as land use, a continuous value, such as temperature, or a null value if no data is available. While a raster cell stores a single value, it can be extended by using raster bands to represent RGB (red, green, blue) colours, colourmaps (a mapping between a thematic code and RGB value), or an extended attribute table with one row for each unique cell value. The resolution of the raster data set is its cell width in ground units.

2. Answer the following questions.

1. Which two abstractions can real world objects be divided into?
2. What is a raster data type?
3. What does raster data type consist of?

TEXT 7
VECTOR

1. Read and translate the text.



A simple vector map, using each of the vector elements: points for wells, lines for rivers, and a polygon for the lake.

In a GIS, geographical features are often expressed as vectors, by considering those features as geometrical shapes. Different geographical features are expressed by different types of geometry: points, lines or polylines, polygons.

Each of these geometries is linked to a row in a database that describes their attributes. For example, a database that describes lakes may contain a lake's depth, water quality, pollution level. This information can be used to make a map to describe a particular attribute of the dataset. For example, lakes could be coloured depending on level of pollution. Different geometries can also be compared. For example, the GIS could be used to identify all wells (point geometry) that are within 1-mile (1.6 km) of a lake (polygon geometry) that has a high level of pollution.

Vector features can be made to respect spatial integrity through the application of topology rules such as 'polygons must not overlap'. Vector data can also be used to represent continuously varying phenomena. Contour lines and triangulated irregular networks (TIN) are used to represent elevation or other continuously changing values. TINs record values at point locations, which are connected by lines to form an irregular mesh of triangles. The face of the triangles represents the terrain surface.

2. Answer the following questions.

1. What are different geographical features expressed by in GIS?
2. How are the geometries linked?
3. What can vector data be used for?

TEXT 8

ADVANTAGES AND DISADVANTAGES TO USING RASTER OR VECTOR

1. Read and translate the text.

There are advantages and disadvantages to using a raster or vector data model to represent reality. Raster datasets record a value for all points in the area covered which may require more storage space than representing data in a vector format that can store data only where needed. Raster data also allows easy implementation of overlay operations, which are more difficult with vector data. Vector data can be displayed as vector graphics used on traditional maps, whereas raster data will appear as an image that, depending on the resolution of the raster file, may have a blocky appearance for object boundaries. Vector data can be easier to register, scale, and re-project. This can simplify combining vector layers from different sources. Vector data is more compatible with relational database environments. They can be part of a relational table as a normal column and processed using a multitude of operators.

The file size for vector data is usually much smaller for storage and sharing than raster data. Image or raster data can be 10 to 100 times larger than vector data depending on the resolution. Another advantage of vector data is that it is easy to update and maintain. For example, a new highway is added. The raster image will have to be completely reproduced, but the vector data, 'roads', can be easily updated by adding the missing road segment. In addition, vector data allows much more analysis capability, especially for 'networks' such as roads, power, rail, telecommunications, etc. For example, with vector data attributed with the characteristics of roads, ports, and airfields, allows the analyst to query for the best route or method of transportation. In the vector data, the analyst can query the data for the largest port with an airfield within 60 miles and a connecting road that is at least two lane highway. Raster data will not have all the characteristics of the features it displays.

2. Answer the following questions.

1. What do raster datasets record?
2. What does raster data allow to do?
3. How many times can raster data be larger than vector data?

TEXT 9
DATA CAPTURE

1. Read and translate the text.

Data capture – entering information into the system – consumes much of the time of GIS practitioners. There are a variety of methods used to enter data into a GIS where it is stored in a digital format.

Existing data printed on paper maps can be digitized or scanned to produce digital data. A digitizer produces vector data as an operator traces points, lines, and polygon boundaries from a map. Scanning a map results in raster data that could be further processed to produce vector data.

Survey data can be directly entered into a GIS from digital data collection systems on survey instruments using a technique called Coordinate Geometry (COGO).

Remotely sensed data also plays an important role in data collection and consist of sensors attached to a platform. Sensors include cameras, digital scanners and LIDAR, while platforms usually consist of aircraft and satellites.

The majority of digital data currently comes from photo interpretation of aerial photographs. Soft copy workstations are used to digitize features directly from stereo pairs of digital photographs. These systems allow data to be captured in two and three dimensions, with elevations measured directly from a stereo pair using principles of photogrammetric.

When data is captured, the user should consider if the data should be captured with either a relative accuracy or absolute accuracy, since this could not only influence how information will be interpreted but also the cost of data capture.

In addition to collecting and entering spatial data, attribute data is also entered into a GIS. After entering data into a GIS, the data usually requires editing, to remove errors, or further processing.

2. Answer the following questions.

1. What is data capture?
2. Where does the majority of digital data currently come from?
3. What should the user consider when data is captured?

TEXT 10
PROJECTIONS, COORDINATE SYSTEMS AND REGISTRATION

1. Read and translate the text.

A property ownership map and a soils map might show data at different scales. Map information in a GIS must be manipulated so that it registers, or fits, with information gathered from other maps. Before the digital data can be analyzed, they may have to undergo other manipulations.

The earth can be represented by various models, each of which may provide a different set of coordinates (e.g., latitude, longitude, elevation) for any given point on the Earth's surface. The simplest model is to assume the earth is a perfect sphere. As more measurements of the earth have accumulated, the models of the earth have become more sophisticated and more accurate.

Projection is a fundamental component of map making. A projection is a mathematical means of transferring information from a model of the Earth, which represents a three-dimensional curved surface, to a two-dimensional medium - paper or a computer screen. Different projections are used for different types of maps because each projection particularly suits certain uses.

Since much of the information in a GIS comes from existing maps, a GIS uses the processing power of the computer to transform digital information, gathered from sources with different projections and/or different coordinate systems, to a common projection and coordinate system. For images, this process is called rectification.

Today, even laypeople are aware of GPS used for locating in terms of latitude, longitude and height. In day-to-day life, the coordinates we see on maps such as those from GPS are geodetic latitude and longitude. It is also imperative to know the datum of the map in use; and if the datum is changed, any selected location can have different geodetic coordinates.

2. Answer the following questions.

1. How must map information in a GIS be manipulated?
2. What is projection?
3. Why are different projections used for different types of maps?

TEXT 11
SPATIAL ANALYSIS WITH GIS
DATA MODELLING

1. Read and translate the text.

Given the vast range of spatial analysis techniques that have been developed over the past half century, any summary or review can only cover the subject to a limited depth. This is a rapidly changing field, and GIS packages are increasingly including analytical tools as standard built-in facilities or as optional toolsets, add-ins or ‘analysts’. In many instances such facilities are provided by the original software suppliers (commercial vendors or collaborative non commercial development teams), whilst in other cases facilities have been developed and are provided by third parties. Furthermore, many products offer software development kits (SDKs), programming languages and language support, scripting facilities and/or special interfaces for developing one’s own analytical tools or variants. The impact of these myriad paths to perform spatial analysis create a new dimension to business intelligence termed ‘spatial intelligence‘ which, when delivered via intranet, democratizes access to operational sorts not usually privy to this type of information.

It is difficult to relate wetlands maps to rainfall amounts recorded at different points such as airports, television stations, and high schools. A GIS, however, can be used to depict two- and three-dimensional characteristics of the Earth’s surface, subsurface, and atmosphere from information points.

Such a map can be thought of as a rainfall contour map. Many sophisticated methods can estimate the characteristics of surfaces from a limited number of point measurements. A two-dimensional contour map created from the surface modelling of rainfall point measurements may be overlaid and analyzed with any other map in a GIS covering the same area.

2. Answer the following questions.

1. What do GIS packages include?
2. What creates ‘spatial intelligence‘?
3. Which two- and three-dimensional characteristics can be depict by GIS?

TEXT 12

TOPOLOGICAL AND CARTOGRAPHIS MODELLING NETWORKS

1. Read and translate the text.

A GIS can recognize and analyze the spatial relationships that exist within digitally stored spatial data. These topological relationships allow complex spatial modelling and analysis to be performed. Topological relationships between geometric entities traditionally include adjacency (what adjoins what), containment (what encloses what), and proximity (how close something is to something else).

If all the factories near a wetland were accidentally to release chemicals into the river at the same time, how long would it take for a damaging amount of pollutant to enter the wetland reserve? A GIS can simulate the routing of materials along a linear network. Values such as slope, speed limit, or pipe diameter can be incorporated into network modelling in order to represent the flow of the phenomenon more accurately. Network modelling is commonly employed in transportation planning, hydrology modelling, and infrastructure modelling.

The term ‘cartographic modelling’ was (probably) coined by Dana Tomlin in his PhD dissertation and later in his book which has the term in the title. Cartographic modelling refers to a process where several thematic layers of the same area are produced, processed, and analyzed. Tomlin used raster layers, but the overlay method can be used more generally. Operations on map layers can be combined into algorithms, and eventually into simulation or optimization models.

2. Answer the following questions.

1. What can a GIS recognize and analyze?
2. What is network modelling commonly employed in?
3. Where did Dana Tomlin coin the term ‘cartographic modelling’?

TEXT 13
MAP OVERLAY
AOTOMATED CARTOGRAPHY

1. Read and translate the text.

The combination of several spatial datasets (points, lines or polygons) creates a new output vector dataset, visually similar to stacking several maps of the same region. A union overlay combines the geographic features and attribute tables of both inputs into a single new output. An intersect overlay defines the area where both inputs overlap and retains a set of attribute fields for each. A symmetric difference overlay defines an output area that includes the total area of both inputs except for the overlapping area.

Data extraction is a GIS process similar to vector overlay, though it can be used in either vector or raster data analysis. Rather than combining the properties and features of both datasets, data extraction involves using a ‘clip’ or ‘mask’ to extract the features of one data set that fall within the spatial extent of another dataset.

In raster data analysis, the overlay of datasets is accomplished through a process known as ‘local operation on multiple rasters’ or ‘map algebra’, through a function that combines the values of each raster’s matrix. This function may weigh some inputs more than others through use of an ‘index model’ that reflects the influence of various factors upon a geographic phenomenon.

Digital cartography and GIS both encode spatial relationships in structured formal representations. GIS is used in digital cartography modeling as a (semi)automated process of making maps, so called Automated Cartography. In practice, it can be a subset of a GIS, within which it is equivalent to the stage of visualization, since in most cases not all of the GIS functionality is used. Cartographic products can be either in a digital or in a hardcopy format. Powerful analysis techniques with different data representation can produce high-quality maps within a short time period. The main problem in Automated Cartography is to use a single set of data to produce multiple products at a variety of scales, a technique known as Generalization.

2. Answer the following questions.

1. What does a symmetric difference overlay define?
2. Where can data extraction be used?
3. What is automated cartography?

TEXT 14
GEOSTATISTICS

1. Read and translate the text.

Geostatistics is a point-pattern analysis that produces field predictions from data points. It is a way of looking at the statistical properties of those special data. It is different from general applications of statistics because it employs the use of graph theory and matrix algebra to reduce the number of parameters in the data. Only the second-order properties of the GIS data are analyzed.

When phenomena are measured, the observation methods dictate the accuracy of any subsequent analysis. Due to the nature of the data, a constant or dynamic degree of precision is always lost in the measurement. This loss of precision is determined from the scale and distribution of the data collection.

To determine the statistical relevance of the analysis, an average is determined so that points (gradients) outside of any immediate measurement can be included to determine their predicted behaviour. This is due to the limitations of the applied statistic and data collection methods, and interpolation is required in order to predict the behaviour of particles, points, and locations that are not directly measurable.

Interpolation is the process by which a surface is created, usually a raster dataset, through the input of data collected at a number of sample points. There are several forms of interpolation, each which treats the data differently, depending on the properties of the data set.

Interpolation is a justified measurement because of a Spatial Autocorrelation Principle that recognizes that data collected at any position will have a great similarity to, or influence of those locations within its immediate vicinity.

Digital elevation models (DEM), triangulated irregular networks (TIN), Edge finding algorithms, Theissen Polygons, Fourier analysis, Weighted moving averages, Inverse Distance Weighted, Moving averages, Kriging, Spline, and Trend surface analysis are all mathematical methods to produce interpolative data.

2. Answer the following questions.

1. What does geostatistics produce?
2. Why is geostatistics different from general applications of statistics?
3. What is the main purpose of interpolation?

TEXT 15
ADDRESS GEOCODING
REVERSE GEOCODING

1. Read and translate the text.

Geocoding is interpolating spatial locations (X,Y coordinates) from street addresses or any other spatially referenced data such as ZIP Codes, parcel lots and address locations. A reference theme is required to geocode individual addresses, such as a road centreline file with address ranges. The individual address locations have historically been interpolated, or estimated, by examining address ranges along a road segment. These are usually provided in the form of a table or database. The GIS will then place a dot approximately where that address belongs along the segment of centreline. Geocoding can also be applied against actual parcel data, typically from municipal tax maps. In this case, the result of the geocoding will be an actually positioned space as opposed to an interpolated point. This approach is being increasingly used to provide more precise location information.

Various algorithms are used to help with address matching when the spellings of addresses differ. Address information that a particular entity or organization has data on, such as the post office, may not entirely match the reference theme. There could be variations in street name spelling, community name, etc. Consequently, the user generally has the ability to make matching criteria more stringent, or to relax those parameters so that more addresses will be mapped. Care must be taken to review the results so as not to map addresses incorrectly due to overzealous matching parameters.

Reverse geocoding is the process of returning an estimated street address number as it relates to a given coordinate. For example, a user can click on a road centreline theme and have information returned that reflects the estimated house number. This house number is interpolated from a range assigned to that road segment. If the user clicks at the midpoint of a segment that starts with address 1 and ends with 100, the returned value will be somewhere near 50. Note that reverse geocoding does not return actual addresses, only estimates of what should be there based on the predetermined range.

2. Answer the following questions.

1. How were address ranges usually provided?
2. What can geocoding be applied against?
3. What is reverse geocoding?

TEXT 16

DATA OUTPUT AND CARTOGRAPHY

GRAPHIC DISPLAY TECHNIQUES

1. Read and translate the text.

Cartography is the design and production of maps, or visual representations of spatial data. The vast majority of modern cartography is done with the help of computers, usually using a GIS but production quality cartography is also achieved by importing layers into a design program to refine it. Most GIS software gives the user substantial control over the appearance of the data.

Cartographic work serves two major functions:

First, it produces graphics on the screen or on paper that convey the results of analysis to the people who make decisions about resources. Wall maps and other graphics can be generated, allowing the viewer to visualize and thereby understand the results of analyses or simulations of potential events.

Second, other database information can be generated for further analysis or use. An example would be a list of all addresses within one mile (1.6 km) of a toxic spill.

Traditional maps are abstractions of the real world, a sampling of important elements portrayed on a sheet of paper with symbols to represent physical objects. People who use maps must interpret these symbols. Topographic maps show the shape of land surface with contour lines or with shaded relief.

A GIS was used to register and combine the two images to render the three-dimensional perspective view looking down the San Andreas Fault, using the Thematic Mapper image pixels, but shaded using the elevation of the landforms. The GIS display depends on the viewing point of the observer and time of day of the display, to properly render the shadows created by the sun’s rays at that latitude, longitude, and time of day.

An archeochrome is a new way of displaying spatial data. It is a thematic on a 3D map that is applied to a specific building or a part of a building. It is suited to the visual display of heat loss data.

2. Answer the following questions.

1. What is cartography?
2. What is traditional map?
3. What does topographic map show?

TEXT 17
FUTURE. OGC STANDARDS

1. Read and translate the text.

Many disciplines can benefit from GIS technology. An active GIS market has resulted in lower costs and continual improvements in the hardware and software components of GIS. These developments will, in turn, result in a much wider use of the technology throughout science, government, business, and industry, with applications including real estate, public health, crime mapping, national defence, sustainable development, natural resources, landscape architecture, archaeology, regional and community planning, transportation and logistics. GIS is also diverging into location-based services (LBS). LBS allows GPS enabled mobile devices to display their location in relation to fixed assets (nearest restaurant, gas station, fire hydrant), mobile assets (friends, children, police car) or to relay their position back to a central server for display or other processing. These services continue to develop with the increased integration of GPS functionality with increasingly powerful mobile electronics (cell phones, laptops).

The Open Geospatial Consortium (OGC) is an international industry consortium of 384 companies, government agencies, universities and individuals participating in a consensus process to develop publicly available geoprocessing specifications. Open Geospatial Consortium (OGC) protocols include Web Map Service (WMS) and Web Feature Service (WFS).

GIS products are broken down by the OGC into two categories, based on how completely and accurately the software follows the OGC specifications.

Compliant Products are software products that comply to OGC’s OpenGIS Specifications. When a product has been tested and certified as compliant through the OGC Testing Program, the product is automatically registered as ‘compliant’ on this site.

Implementing Products are software products that implement OpenGIS Specifications but have not yet passed a compliance test. Compliance tests are not available for all specifications. Developers can register their products as implementing draft or approved specifications, though OGC reserves the right to review and verify each entry.

2. Answer the following questions.

1. What is The Open Geospatial Consortium?
2. What are Compliant Products?
3. What are Implementing Products?

TEXT 18
WEB MAPPING

1. Read and translate the text.

Global change, climate history program and prediction of its impact.

In recent years there has been an explosion of mapping applications on the web such as Google Maps and Live Maps. These websites give the public access to huge amounts of geographic data.

In recent years web mapping services have begun to adopt features more common in GIS. Services such as Google Maps and Live Maps allow users to annotate maps and share the maps with others.

Maps have traditionally been used to explore the Earth and to exploit its resources. GIS technology, as an expansion of cartographic science, has enhanced the efficiency and analytic power of traditional mapping. Now, as the scientific community recognizes the environmental consequences of human activity, GIS technology is becoming an essential tool in the effort to understand the process of global change. Various map and satellite information sources can combine in modes that simulate the interactions of complex natural systems.

Through a function known as visualization, a GIS can be used to produce images - not just maps, but drawings, animations, and other cartographic products. These images allow researchers to view their subjects in ways that literally never have been seen before. The images are often invaluable for conveying the technical concepts of GIS study subjects to non-scientists.

Prediction of the impact of climate change inherently involves many uncertainties stemming from data and models. GIS incorporated with uncertainty theory has been used to model the coastal impact of climate change, including inundation due to sea-level rise and storm erosion.

2. Answer the following questions.

1. How have mapping researches been changed in recent years?
2. What have maps traditionally been used?
3. What can a GIS be used for through a function known as visualization?

TEXT 19

ADDING THE DIMENTION OF TIME

1. Read and translate the text.

The condition of the Earth's surface, atmosphere, and subsurface can be examined by feeding satellite data into a GIS. GIS technology gives researchers the ability to examine the variations in Earth processes over days, months, and years. As an example, the changes in vegetation vigour through a growing season can be animated to determine when drought was most extensive in a particular region. The resulting graphic, known as a normalized vegetation index, represents a rough measure of plant health. Working with two variables over time would then allow researchers to detect regional differences in the lag between a decline in rainfall and its effect on vegetation.

GIS technology and the availability of digital data on regional and global scales enable such analyses. This sensor system detects the amounts of energy reflected from the Earth's surface across various bands of the spectrum for surface areas of about 1 square kilometre. The satellite sensor produces images of a particular location on the Earth twice a day.

GIS and related technology will help greatly in the management and analysis of these large volumes of data, allowing for better understanding of terrestrial processes and better management of human activities to maintain world economic vitality and environmental quality.

In addition to the integration of time in environmental studies, GIS is also being explored for its ability to track and model the progress of humans throughout their daily routines. A concrete example of progress in this area is the recent release of time-specific population data by the US Census. In this data set, the populations of cities are shown for daytime and evening hours highlighting the pattern of concentration and dispersion generated by North American commuting patterns. The manipulation and generation of data required to produce this data would not have been possible without GIS.

Using models to project the data held by a GIS forward in time have enabled planners to test policy decisions. These systems are known as Spatial Decision Support Systems.

2. Answer the following questions.

1. How can the condition of the Earth's surface, atmosphere, and subsurface be examined?
2. What does GIS technology give researchers?
3. What is GIS being explored for?

TEXT 20
SEMANTICS. SOCIETY

1. Read and translate the text.

Tools and technologies are proving useful for data integration problems in information systems. Correspondingly, such technologies have been proposed as a means to facilitate interoperability and data reuse among GIS applications and also to enable new analysis mechanisms.

Ontologies are a key component of this semantic approach as they allow a formal, machine-readable specification of the concepts and relationships in a given domain. This in turn allows a GIS to focus on the meaning of data rather than its syntax or structure. For example, reasoning that a land cover type classified as Deciduous Needleleaf Trees in one dataset is a specialization of land cover type Forest in another more roughly-classified dataset can help a GIS automatically merge the two datasets under the more general land cover classification. Very deep and comprehensive ontologies have been developed in areas related to GIS applications. Also, simpler ontologies and semantic metadata standards are being proposed by the W3C Geo Incubator Group to represent geospatial data on the web.

Recent research results in this area can be seen in the International Conference on Geospatial Semantics and the Terra Cognita – Directions to the Geospatial Semantic Web workshop at the International Semantic Web Conference.

With the popularization of GIS in decision making, scholars have begun to scrutinize the social implications of GIS. It has been argued that the production, distribution, utilization, and representation of geographic information are largely related with the social context. Other related topics include discussion on copyright, privacy, and censorship. A more optimistic social approach to GIS adoption is to use it as a tool for public participation.

2. Answer the following questions.

1. Why are ontologies a key component of the semantic approach?
2. Why have scholars begun to scrutinize the social implications of GIS?
3. What is a more optimistic social approach to GIS adoption?

SOURCES

1. David E. Davis. GIS for Everyone. ESRI Press. 2001

CONTENTS

НАВЧАЛЬНЕ ВИДАННЯ

Збірник текстів і завдань до самостійної роботи
з дисципліни **«Іноземна мова професійного спрямування»**
(англійська мова)
для студентів 1-2 курсів заочної форми навчання напряму 6.080101
«Геодезія, картографія та землеустрій»

Укладач **Крохмаль** Алла Миколаївна

Відповідальний за випуск *І. О. Наумова*
Редактор *М. З. Аляб'єв*
Комп'ютерне верстання *А. М. Крохмаль*

План 2010, поз. 444М

Підп. до друку 28.04.10	Формат 60 х 84 1/16	Папір офісний
Друк на різографі.	Умовн.-друк. арк. 1,2	
Зам. №	Тираж 50 пр.	

Видавець і виготовлювач:
Харківська національна академія міського господарства,
вул. Революції, 12, Харків, 61002
Електронна адреса: rectorat@ksame.kharkov.ua
Свідоцтво суб'єкта видавничої справи: ДК № 4064 від 12.05.2011